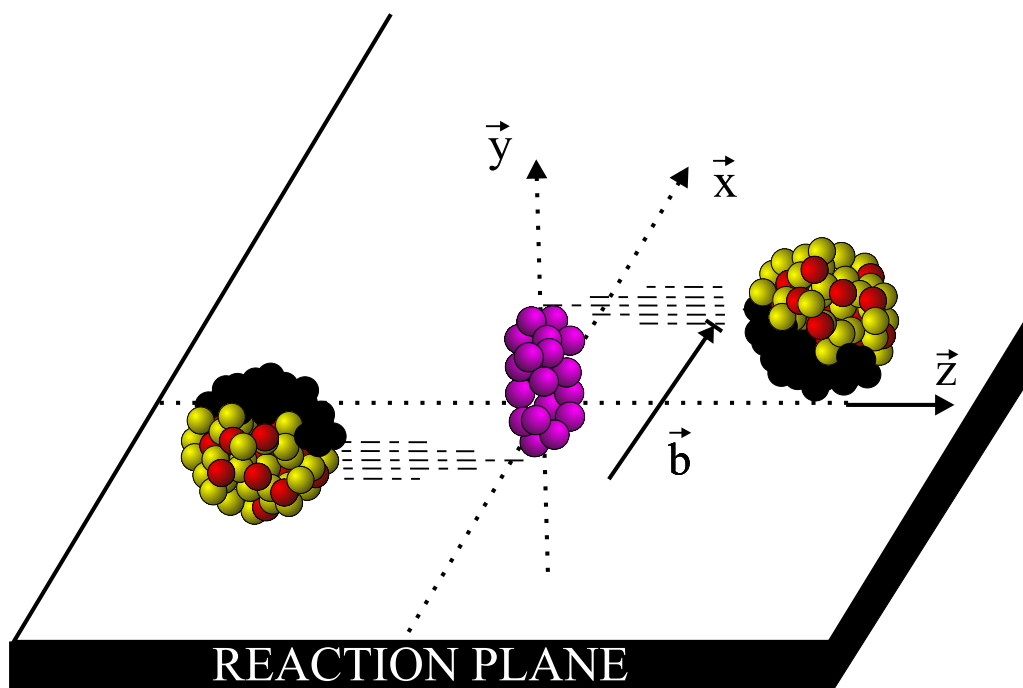


Novel rapidity dependence of directed flow at RHIC

nucl-ex/9908001 – nucl-ex/9904003 – STAR Note 388



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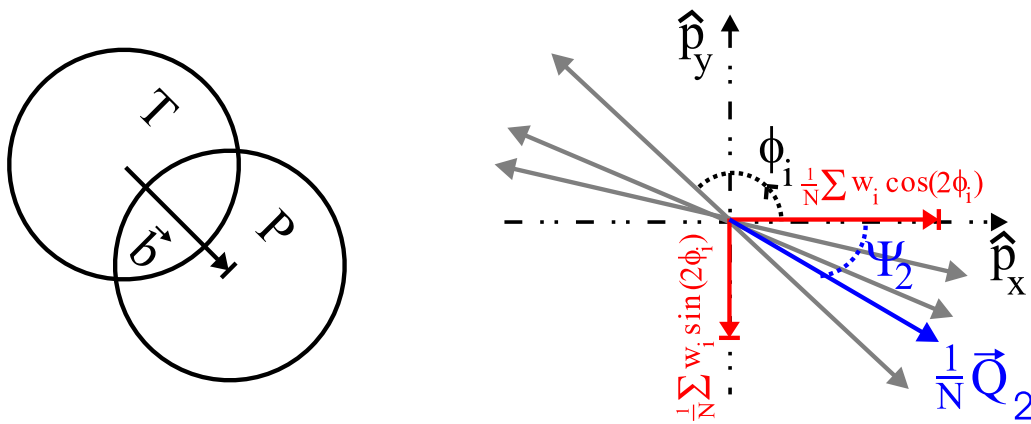
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- Anisotropic Flow EOS – State of Matter
- F/v_1 from 50A MeV – 158A GeV
- RHIC $\left\{ \begin{array}{l} \text{Incomplete stopping} \\ \text{space-momentum correlation} \end{array} \right.$ Novel rapidity dependence of v_1
- Summary

Definitions

- Event plane reconstruction:



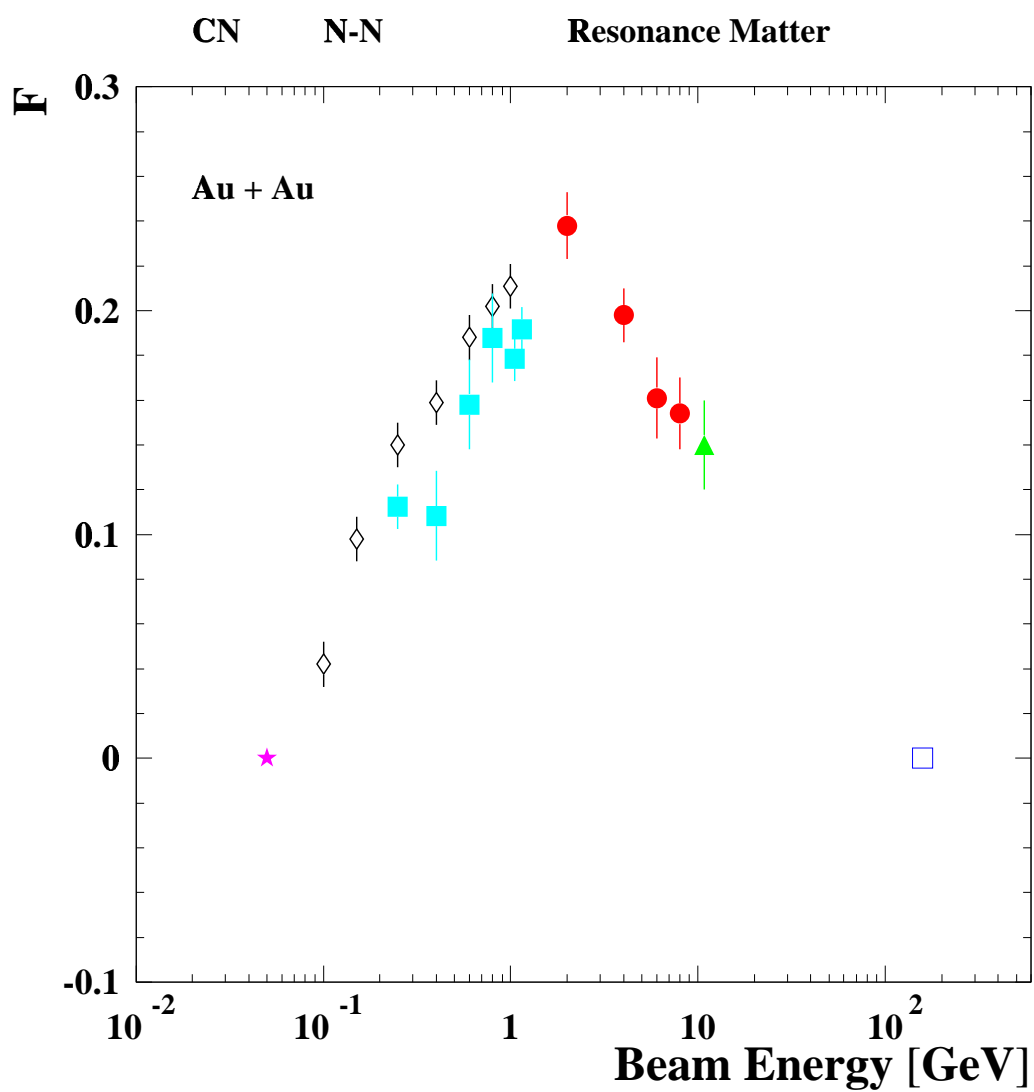
$$\Psi_n = \frac{1}{n} \left(\tan^{-1} \frac{\sum_i^N w_i \sin(n \phi_i)}{\sum_i^N w_i \cos(n \phi_i)} \right)$$

- F/v_1 :

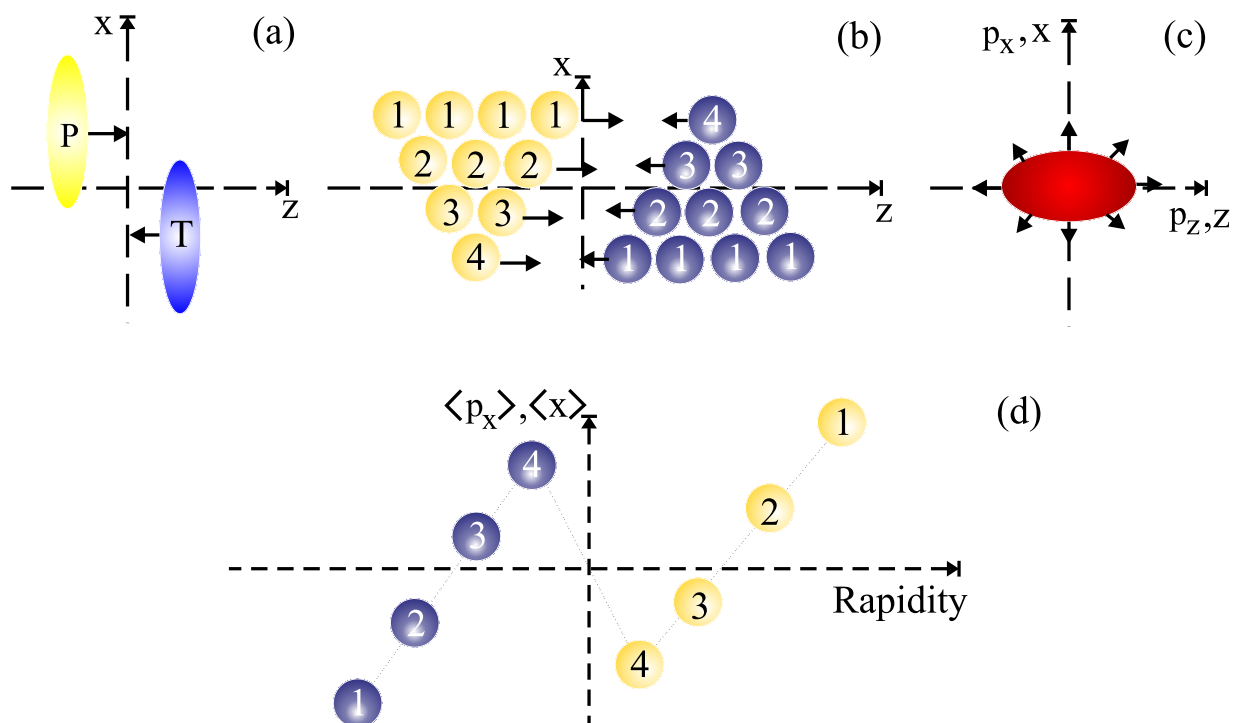
$$F = \frac{d \langle p'_x / A \rangle}{dy_n} \Big|_{y_n=0}$$

$$E \frac{d^3 N}{d^3 p} = \frac{1}{2\pi} \frac{d^2 N}{p_t dp_t dy} \left(1 + \sum_{n=1}^{\infty} 2v_n \cos[n(\phi - \Psi_r)] \right)$$

F from 50 A MeV – 158 A GeV

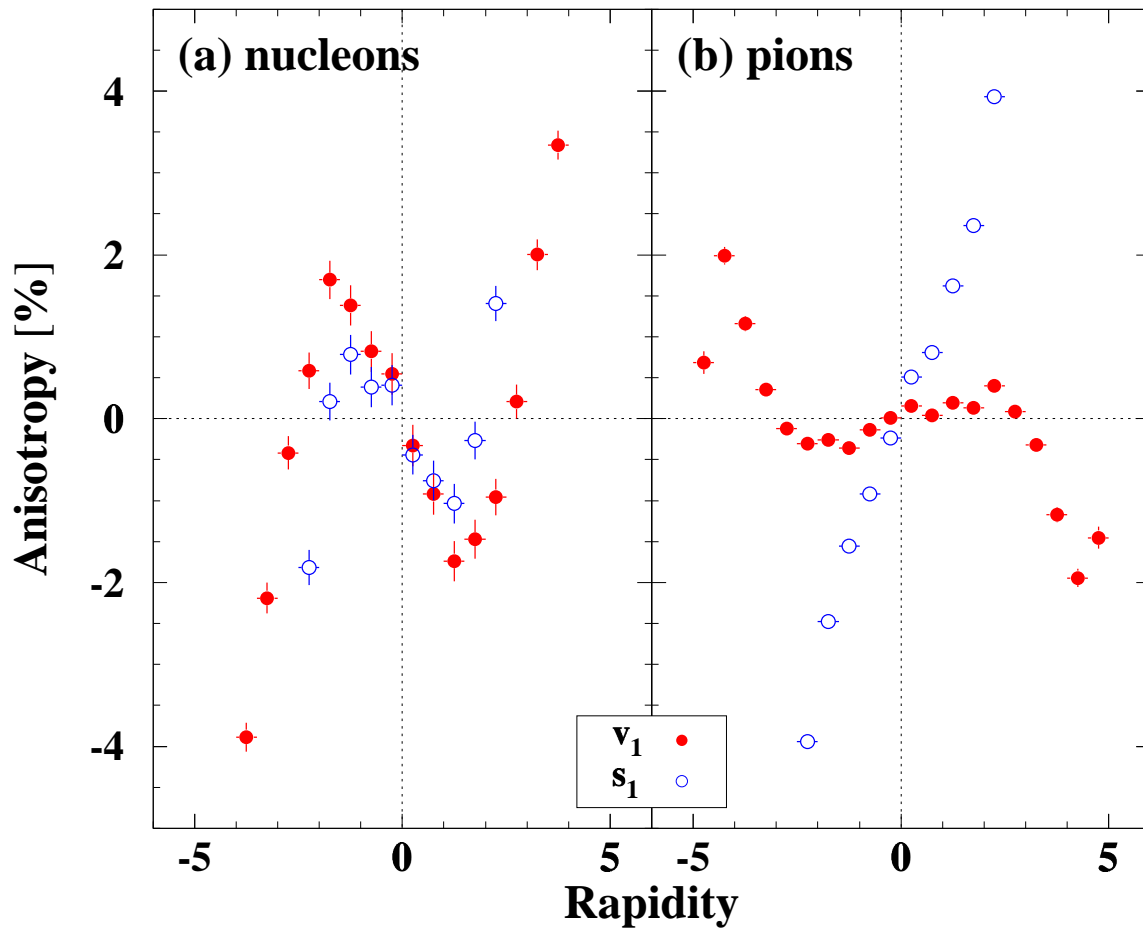


negative flow (cartoon)



- nucl-ex/9908001
(R.J.M. Snellings, H. Sorge, S.A. Voloshin, F.Q. Wang, N. Xu)

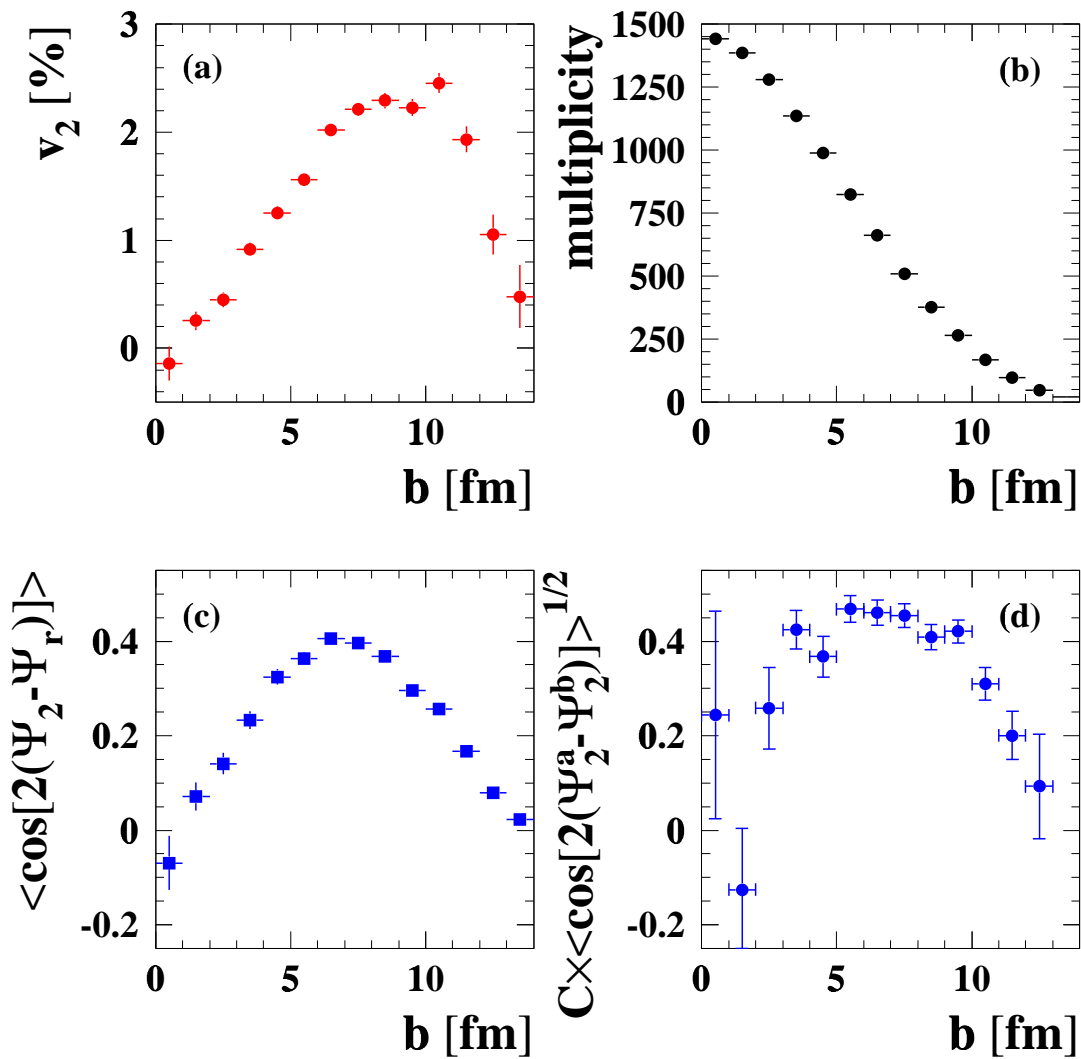
negative flow (RQMD)



$$v_n = \langle \cos[n(\phi - \Psi_r)] \rangle$$

$$s_n = \langle \cos[n(\text{atan}(\frac{y}{x}) - \Psi_r)] \rangle$$

Event plane resolution (v_2 , $\pi^+ + \pi^-$, TPC)



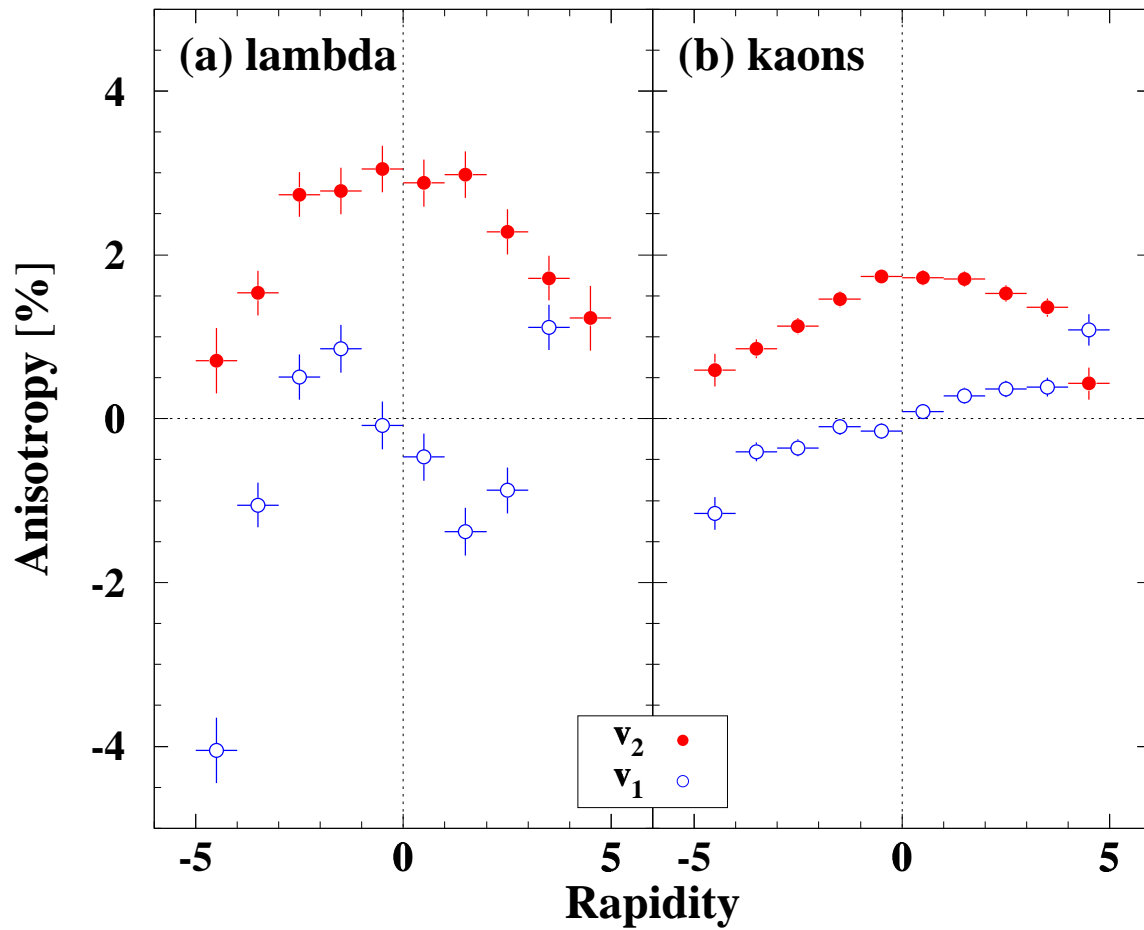
$$v_n = \frac{v_n^{\text{obs}}}{\langle \cos[n(\Psi_n - \Psi_r)] \rangle}$$

$$\langle \cos[n(\Psi_n^a - \Psi_r)] \rangle = \sqrt{\langle \cos[n(\Psi_n^a - \Psi_n^b)] \rangle}$$

Summary

- Systematics of F/v_1 show changes in EOS.
- At RHIC: Novel rapidity dependence of directed flow.
- Connection between radial flow and baryon stopping.

negative flow (RQMD)



$$v_n = \langle \cos[n(\phi - \Psi_r)] \rangle$$

$$s_n = \langle \cos[n(\text{atan}(\frac{y}{x}) - \Psi_r)] \rangle$$